

RV MARIA S. MERIAN MSM77

4th Weekly Report

01.-07. October 2018

End of this year's "gardening" work

Last week we worked mainly in central and northern parts of the Fram Strait. Once again we used the entire range of instruments that we had with us on this expedition. The sampling in the water column and at the deep seafloor, which was already described in the last weekly reports, was carried out routinely and in rapid succession - and was successful throughout.

The colleagues in our AUV team had to make certain compromises. Their investigations focus on physical and closely related biological processes at front systems, such as those found between the warmer Atlantic water in the eastern Fram Strait and the colder water masses in the West of the strait. An Autonomous Underwater Vehicle (AUV) is ideally suited for this type of investigations as it is capable of generating an extremely tight grid of data points. Unfortunately, the planned operations of our AUV in front of the ice edge in the westernmost part of our HAUSGARTEN had to be cancelled at short notice due to the continuing "unfavourable" weather conditions. Wind forces of about 7 Beaufort had set the sea in motion in such a way that the 2-3 m high waves did not permit the safe operation of the vehicle. But exactly for such situations you always have a "plan B":

After a drift ice field had separated from the sea ice off the Greenland coast in the middle of the week and a long, loosely connected sea ice "tongue" had formed towards the east on the open sea, we spontaneously changed our plans and used the ship to conduct an approx. 45 km long transect crossing this ice field. A so-called "CTD/Rosette Water Sampler" was used about every 1.5 km to examine the water layers under the ice field. The device carries a series of sensors to measure various physical and biochemical parameters as well as a ring-shaped arrangement of water samplers which can be individually closed on an electrical signal. In this way, data on oxygen concentration and salinity, nitrate concentration and temperature distribution can be collected. Water samples taken at different depths provide information on additional biochemical parameters (e.g. dissolved organic carbon and nitrogen) and will be analysed at a later stage for the dominant plankton species. Within 24 hours, data from 33 vertical profiles and more than 160 water samples could be obtained. Such sampling can of course hardly replace the use of an AUV, however, it ultimately led to a very interesting and extensive data set, albeit with a significantly coarser spatial resolution.

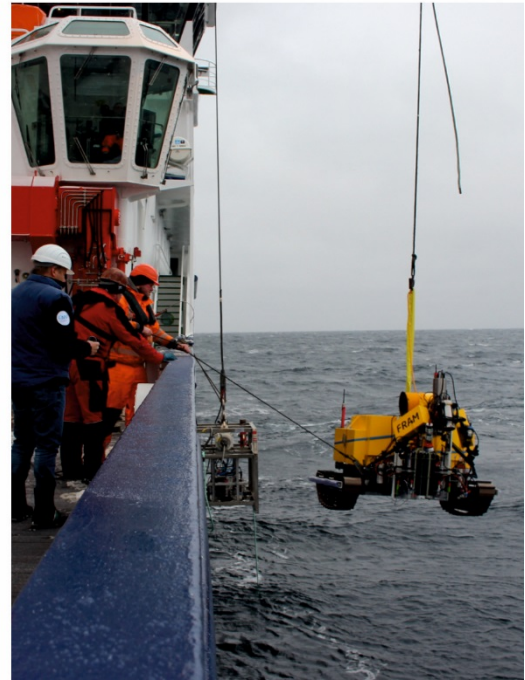
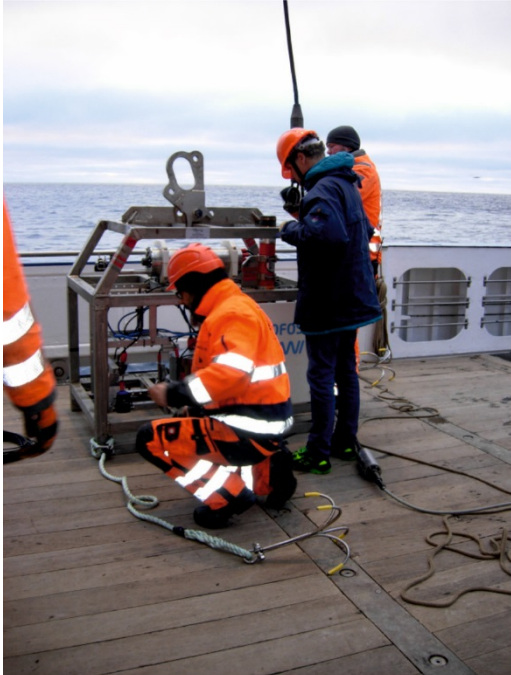
Towards the end of the week we succeeded in a spectacular recovery operation of one of the autonomous bottom vehicles (Benthic Crawler), which we had deployed last week in 1500 m water depth on the Vestnesa Ridge off Spitsbergen. Our Benthic Crawler NOMAD had

persistently "denied" the dropping of its basic weight, so that the device could not independently return to the sea surface by its buoyancy. Therefore we had no other choice than to "fish" for the vehicle. For this we used our towed camera system OFOS (Ocean Floor Observations System) underneath we attached strong ropes with large hooks (see figure). Since we knew the location of the NOMAD at the seafloor, we rather quickly found the device with the camera system. However, reaching the vehicle with one of the hooks was much more difficult, required a lot of patience and even more skill. Thanks to the incredible manoeuvrability of the "Maria S. Merian", which enabled us to hold the ship exactly in position and move it precisely at meter-scales (!), the ship's command and the winch operator finally managed to "pick up" the device and bring it safely back to the sea surface (see figure). Our NOMAD did not suffer any damage during this action and there was a great relief to have the relatively expensive vehicle back on board.

Yesterday our Autonomous Underwater Vehicle "PAUL" was used one last time in front of the great panorama of Spitsbergen to test the new sonar system of the AUV in front of the Kongsfjord. Afterwards we set sail for Edinburgh, where the expedition will end in the afternoon of October 12th. On our way to Edinburgh, we will encounter an extensive low-pressure system with all its negative side effects - anyway, nothing will affect the generally positive atmosphere on board.

With best regards from on board,

Thomas Soltwedel



Recovery of the Benthic Crawler NOMAD: The photo/video system OFOS with hooks attached to the frame (top left), searching for the gear (top right), finally hooked up (bottom left), back again at the sea surface (bottom right); all images copyright: Deep-Sea Research Group, AWI.